

Investigation of salt distribution in porous stone material using paper pulp poultices under laboratory conditions and on site

Isabel Egartner and Oliver Sass

Department of Geography and Regional Science, University of Graz, Austria (isabel.egartner@uni-graz.at)

The presented investigation is part of a longer-term project which deals with the influence of salt and moisture on weathering of historic stonework. The main investigation object in the field is a part of the 300 hundred year old boundary wall of the Worcester College in Oxford, UK. A range of non-destructive techniques were applied in course of field campaigns, e.g. mapping of weathering phenomena; handheld moisture sensors; and salt sampling by paper pulp poultices. In a second step we investigated the behaviour and distribution of water and salt solution in a porous material, similar to the limestone of the College wall, under laboratory conditions. Limestone cube samples (5x5x5 cm) were soaked first with ultrapure H₂O and second with different concentration of saline solutions of NaCl and Na₂SO₄. During the dehydration process of the stone cubes a multi-method approach including sampling by drilling, paper pulp poultices, handheld moisture sensor, conductivity sensor and Ion Chromatography (IC) were applied to investigate the moisture and salt content and distribution within the samples. The laboratory analyses were carried out at the department of applied geoscience of the Technical University of Graz, Austria. The main aim was to investigate the effectivity of the paper pulp poultices in soaking up salts from the stone samples and to use the results of the laboratory analysis to interpret and calibrate the field work results from the College wall in Oxford.

Keywords: Salt weathering, paper pulp poultices, cultural heritage, field work and laboratory investigation